CLAIMS

What is claimed is:

1. A system for the manufacture of hydrogen cyanide, acrylonitrile, and acetonitrile, the system comprising:

at least one pulsed corona discharge reactor, each pulsed corona discharge reactor having a reaction zone; and

at least one product stream containing hydrogen produced in the pulsed corona discharge reactor and contacting the catalyst;

wherein hydrogen is removed from the reactant to form hydrogen cyanide, acrylonitrile, and acetonitrile.

2. The system of claim 1 wherein the pulsed corona discharge reactor has walls, the walls being constructed from membrane materials suitable for the selective continuous removal of hydrogen formed from the decomposition of the ammonia and hydrocarbon(s) in the reaction zone wherein the continuous removal of hydrogen from the reaction zone drives the reaction to completion.

3. The system of claim 1 wherein the reactant feed stream has an additive selected from the group consisting of air, oxygen and other combinations of nitrogen and oxygen.

4. The system of claim 1 wherein the reactant feed stream includes ammonia and hydrocarbons.

5. The system of claim 4 wherein the hydrocarbons include methane, ethane, propane, propylene, and ethylene.

6. The system of claim 1 and further comprising:

inert gases added to the reaction zone for increasing the density of ions in the reaction zone.

7. The system of claim 1 wherein the pulsed corona discharge reactor operates on continuous/intermittent removal of products from the reaction zone.

8. The system of claim 1 and wherein the reactants are hydrocarbon and ammonia, a solid phase catalyst is positioned within the reaction zone, and air, oxygen, and/or nitrogen are added to the feed stream.

9. The system of claim 1 wherein the reaction zone contains a catalyst.

10. A system for the manufacture of hydrogen cyanide, acrylonitrile, and acetonitrile, the system comprising:

a pulsed corona discharge reactor; and

a feed stream introduced into the pulsed corona discharge reactor;

wherein the following reaction is created:

hydrocarbon + ammonia + oxygen + nitrogen → HCN + ACN + acetonitrile + carbon oxides + hydrogen + water.

11. A method for manufacturing hydrogen cyanide, acrylonitrile, and acetonitrile, the method comprising:

providing at least one pulsed corona discharge reactor, each pulsed corona discharge reactor having a reaction zone;

positioning a catalyst in the reaction zone;

introducing at least one reactant feed stream containing hydrogen into the pulsed corona discharge reactor and contacting the catalyst; and

removing hydrogen from the reactant to form hydrogen cyanide, acrylonitrile, and acetonitrile.

12. The method of claim 11 and further comprising:

constructing the walls of the pulsed corona discharge reactor has walls from membrane materials suitable for the selective continuous removal of hydrogen formed from the decomposition of the ammonia and

hydrocarbon(s) in the reaction zone wherein the continuous removal of hydrogen from the reaction zone drives the reaction to completion.

13. The method of claim 11 and further comprising:

introducing an additive selected from the group consisting of air, oxygen and other combinations of nitrogen and oxygen into the reactant feed stream.

14. The method of claim 11 and further comprising:

adding ammonia and hydrocarbons into the reactant feed streams.

15. The method of claim 14 wherein the hydrocarbons include methane, ethane, propane, propylene, and ethylene.

16. The method of claim 11 and further comprising:

increasing the density of ions in the reaction zone with inert gases added to the reaction zone.

17. The method of claim 11 and further comprising:

operating the pulsed corona discharge reactor on continuous/intermittent removal of products from the reaction zone.

18. The method of claim 11 and wherein the reactants are hydrocarbon and ammonia, a solid phase catalyst is positioned within the reaction zone, and air, oxygen, and/or nitrogen are added to the feed stream.